

THE STATUS OF CERTAIN BRACONIDAE (HYMENOPTERA)
CULTURED FOR BIOLOGICAL CONTROL PROGRAMS, AND
DESCRIPTION OF A NEW SPECIES OF
MACROCENTRUS

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Abstract.—Descriptions and illustrations of diagnostic features of certain Braconidae (Hymenoptera) are provided for several biological control programs. *Macrocentrus prolificus*, new species, is described from specimens reared from *Diatraea considerata* Heinrich (Pyralidae) infesting sugar cane in Sinaloa, Mexico and subsequent cultures established on *Diatraea saccharalis* (F.). The status of *Opius dissitus* Muesebeck, *O. bruneipes* Gahan, *O. dimidiatus* (Ashmead), and *Oenonogastra microrhopalae* (Ashmead) is clarified. These names have been misapplied during recent studies of the natural enemies of leaf-miners (*Liriomyza*, spp. (Diptera: Agromyzidae)).

A previously undescribed braconid species has recently been discovered during an expedition to Sinaloa, Mexico for natural enemies of pyralid stem borers of sugar cane in Texas. It is described here to make the name available for this program. The holotype is deposited in the U.S. National Museum of Natural History (USNM), and paratypes in the Texas A&M University Collection, the Rijksmuseum van Natuurlijke Historie, Leiden, and the Haeselbarth collection, Munich.

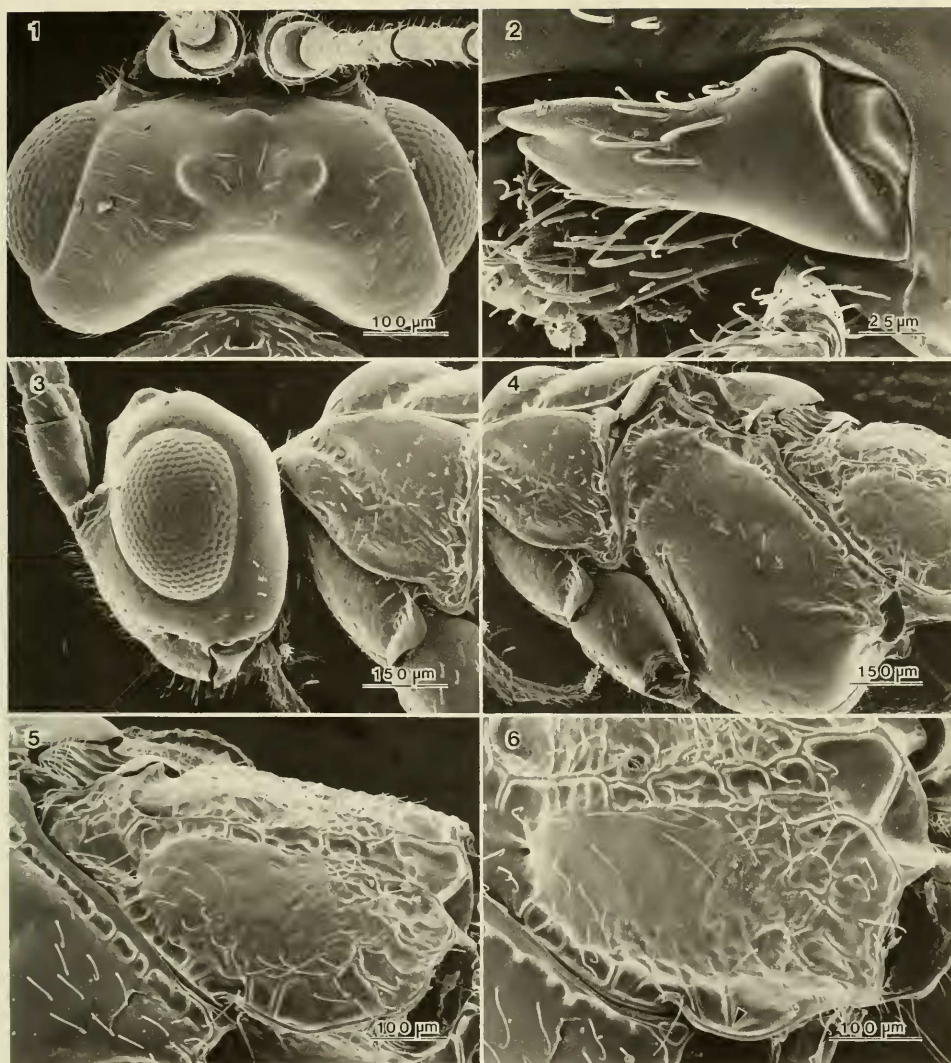
Several previously described opiine and alysiine braconids are also being used against leaf-miners of the genus *Liriomyza* in biological control programs in California, Georgia, Florida, and the British Commonwealth. Descriptive information and illustrations of diagnostic features are provided for these poorly known species to assist in their identification.

Descriptive terminology is principally after Wharton (1977) except as follows: terms used by van Achterberg (1979) are given in parentheses for *Macrocentrus prolificus*, n. sp., to facilitate comparisons with recent revisionary work on this group (e. g., van Achterberg, 1982). Mesosoma and metasoma are used respectively for thorax plus propodeum and petiole plus gaster. Variation in quantitative characters is indicated by a mean and standard deviation based on 10 individuals. Measurements and analyses of sculpture patterns were made at 50× magnification.

Macrocentrus prolificus Wharton, NEW SPECIES

Figs. 1-13, 21

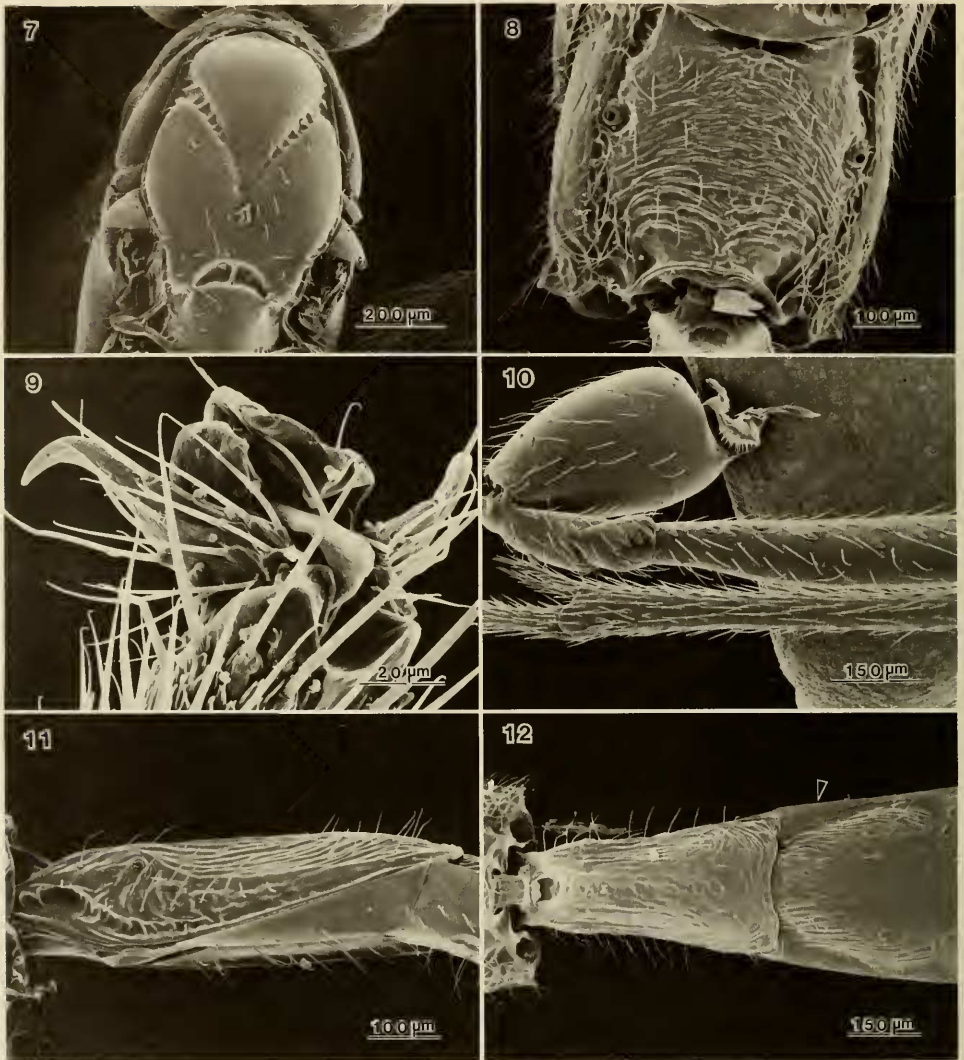
♀ Head.—36-38 antennal segments, 3rd segment $1.43 \pm 0.08 \times$ longer than 4th, 3rd and 4th segments, respectively, 7.19 ± 0.88 and $5.34 \pm 0.69 \times$ longer than



Figs. 1–6. *Macrocentrus prolificus*, new species. 1, Dorsal view of head, showing size of ocellar triangle. 2, Left mandible. 3, Lateral view of head and pronotum. 4, Lateral view of mesonotum. 5, Lateral view of metapleuron and propodeum. 6, Dorsolateral view of metapleuron, showing flange (arrow).

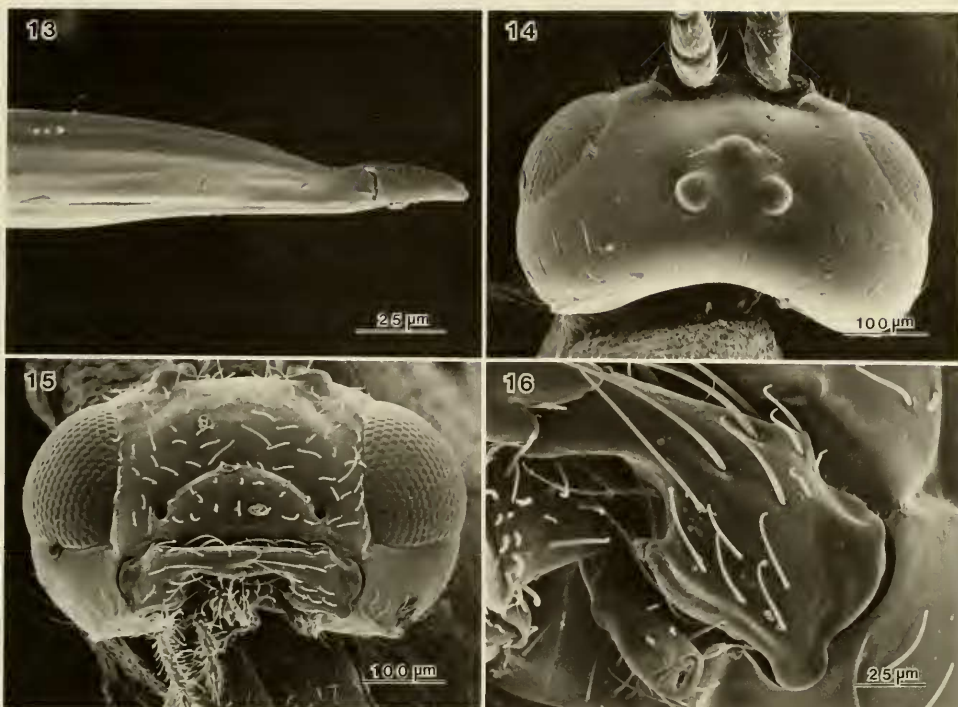
wide, apical segment with “spine.” Maxillary palp nearly equal in length to head height. Eye length in dorsal view 3.23 ± 0.38 times temple; temple weakly receding. Ocelli as in Fig. 1; frons nearly flat, unsculptured. Face weakly convex, sparsely punctate; clypeus weakly convex, apically truncate. Malar space equal in length to basal width of mandible; apical half of mandible twisted; dorsal tooth a little longer and much narrower than ventral tooth (Fig. 2).

Mesosoma.—Length 1.64 ± 0.5 times height. Pronotum with shallow pronope; pronotum laterally with weakly crenulate to nearly smooth median groove (Fig. 3), posterior margin more distinctly crenulate. Prepectal carina complete ventrally,



Figs. 7–12. *Macrocentrus prolificus*, new species. 7, Dorsal view of pronotum and mesonotum. 8, Dorsal view of propodeum. 9, Hind tarsal claw. 10, Anterior face of middle leg, showing teeth on trochanter and femur. 11, Lateral view of petiole, showing sculpture. 12, Dorsal view of metasoma, showing sculpture and scabrous spot (arrow).

continuing dorsally nearly to margin of mesopleuron; subalar depression (= epicnemial area) smooth, moderately hairy; sternaulus (= precoxal sulcus) shallow, distinct only over posterior half of mesopleuron, weakly crenulate to smooth or nearly so (Fig. 4); pleural sulcus crenulate. Metapleural flange long, narrow, somewhat crenulate dorsally (Figs. 5–6); metapleuron largely smooth medially. Notauli crenulate, the sculpture rarely extending to posterior margin of mesonotum; mesonotum sparsely hairy (Fig. 7); prescutellar pit (= scutellar sulcus) with midridge and usually 1 or 2 weaker lateral ridges or carinae; scutellum moderately convex, sparsely hairy. Propodeum densely transversely strigose (Fig. 8), median longitudinal carina absent.



Figs. 13–16. 13, Apical portion of ovipositor of *Macrocentrus prolificus*, new species. 14–16, *Opus dissitus* Muesebeck, head. 14, dorsal view. 15, Anterior view. 16, Base of left mandible.

Wings (Fig. 21).—Discal cell sessile anteriorly; subbasal cell setose throughout; 1st and 2nd radial segments (= r and 3-SR) long, r2 (= 3-SR) $1.91 \pm 0.17 \times$ longer than r1 (= r); r3 (= SR1) $2.80 \pm 0.16 \times$ longer than r2; 1-SR + M very weakly sinuate; nervulus (= cu-a) curved, inclivous; cuqul (= 2-SR) $0.92 \pm 0.10 \times$ length of r2; anal cross vein (= 2A) usually present as a small, sclerotized knob.

Legs.—Hindcoxa smooth; tarsal claws slender, without lobes (Fig. 9). Hindfemur 6.38 ± 0.24 times longer than wide, hindtibia $12.29 \pm 0.86 \times$ longer than wide, hindbasitarsus $9.04 \pm 0.73 \times$ longer than wide; hindtibial spurs about $\frac{1}{3}$ length of basitarsus; second segment of hind- and midtrochanter usually with 4 or 5 teeth on anterior face (Fig. 10), foretrochanter with 4–6 teeth, anterior face of hind- and midfemora with 4 to 11 teeth (highly variable), forefemur usually with 3 or 4 teeth, curved.

Metasoma.—Petiole $1.72 \pm 0.10 \times$ longer than apical width, rugulose along midline (Fig. 12), striate or weakly striate on either side of midline, striate to rugose laterally (Fig. 11); 2nd tergum variously striate, the sculpture weaker than on petiole, usually smooth median-apically; scabrous spot distinctly anterior to middle of tergum; 3rd tergum occasionally with weak striae at extreme base; metasoma otherwise smooth. Ovipositor with a weak subapical notch (Fig. 13); ovipositor a little longer than length of body, sheath $1.52 \pm 0.05 \times$ longer than forewing.

Color.—Yellow-orange; ovipositor sheath brown; flagellum gradually darkening from yellow at base to brown at apex; head dark brown above, face, clypeus, and

gena usually pale, brown in some specimens. Stigma dark medially, with parastigma, basal $\frac{1}{5}$ to $\frac{1}{6}$, and extreme apex yellow; wings hyaline.

Length.—3–4 mm.

♂.—Essentially as in ♀, but with distal flagellomeres more narrowly elongate, and the prepectal carina often weaker dorsally, sometimes interrupted; metasoma beyond 3rd tergum brown; body length up to 4.5 mm.

Material examined.—Holotype ♀: MEXICO: Sinaloa, El Dorado Sugar Mill near Culiacan, V-26-1983, F. Bennett, J. W. Smith, Jr., H. Browning, ex *Diatraea considerata* Heinrich. Paratypes: 50 ♀ 50 ♂, Sinaloa, El Dorado Sugar Mill near Culiacan, V-26-1983, and La Primavera Sugar Mill near Navalota, V-27,28-1983, F. Bennett, J. W. Smith, Jr., H. Browning, all reared from *D. considerata* and *D. grandiosella* (Dyar). USA: Texas A&M University, laboratory cultures established from Sinaloa collections, and reared on *D. saccharalis* (F.). The species is apparently polyembryonic, with about 50 individuals of the same sex emerging from a single host. The specific epithet is derived from this biological feature.

Diagnosis.—This species is most similar to *M. crambi* (Ashmead) and *M. crambivorus* Viereck, and keys to couplet 4 in Muesebeck (1932). All three species have short palpi, long legs, and slender tarsal claws (without lobes). In addition, there are relatively few antennal segments, the ovipositor is only a little longer than the body, and the 2nd tergum is similarly striate in all three species. *Macrocentrus prolificus* differs from the other two species in the shape of the 2nd cubital cell, which is narrower and longer. The mandibular teeth are also more nearly equal in length (dorsal tooth much longer in *M. crambi* and *M. crambivorus*), and the meso- and metasoma are pale throughout in the female.

Discussion.—Variation in sculpture and morphometrics is evident in the large amount of material available for study. The sculpture of the metasomal terga, sternauli, notauli, and mesonotal midline seems to increase slightly with specimen size. The propodeal sculpture is also variable, and not always obviously transversely strigose, especially in males. The number and pattern of teeth on the trochanter, and especially on the femur, was surprisingly variable. However, these teeth were always better developed in *M. prolificus* than in either *M. crambi* or *M. crambivorus*.

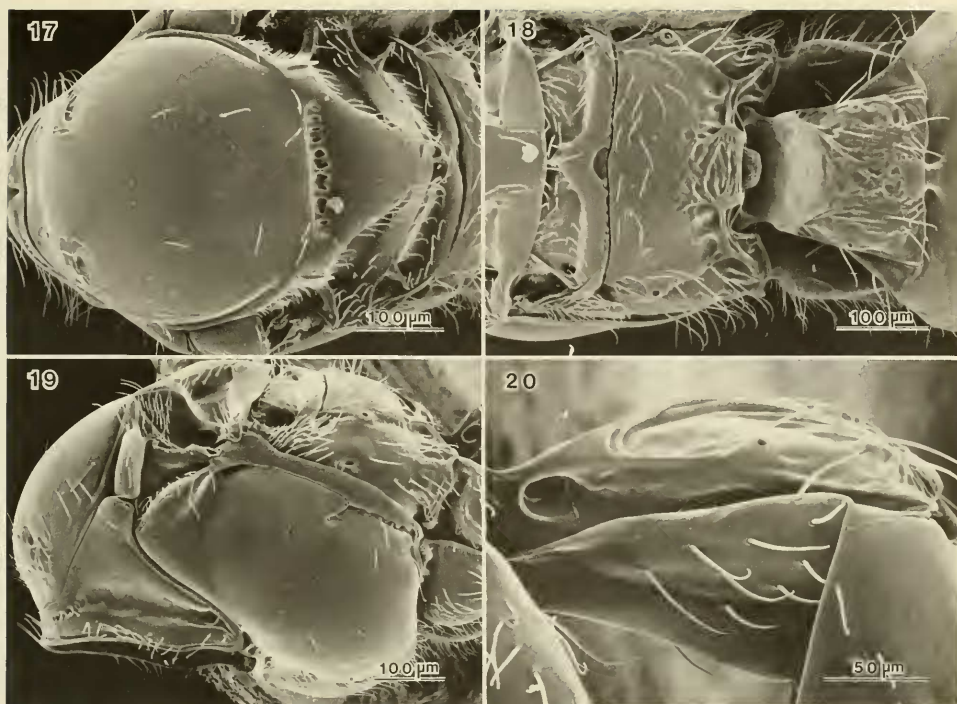
Opius dissitus Muesebeck

Figs. 14–20, 22

Opius dissitus Muesebeck, 1963: 289–290.

Opius dissitus Muesebeck: Fischer, 1977: 596–598 (redescription).

Head.— $1.43 \pm 0.05 \times$ broader than mesonotum, temples receding in dorsal view; eye in lateral view $1.87 \pm 0.36 \times$ longer than temple. Frons glabrous, vertex nearly so, ocelli as in Fig. 14. Face (Fig. 15) very weakly hair-punctured, nearly smooth, not densely hairy, with midridge very weak to absent. Clypeus about twice wider than high, semicircular, with 2 rows of long hairs (hairs at least $2 \times$ length of those on face); no opening between clypeus and mandibles when mandibles closed. Mandible (Fig. 16) broad basally, abruptly narrowing along ventral border, with apical $\frac{1}{2}$ – $\frac{2}{3}$ very narrow; dorsal tooth longer and broader than ventral tooth. Malar space distinctly less than basal width of mandible. Antennae 20–22 segmented, widely separated, distance between sockets greater than distance be-

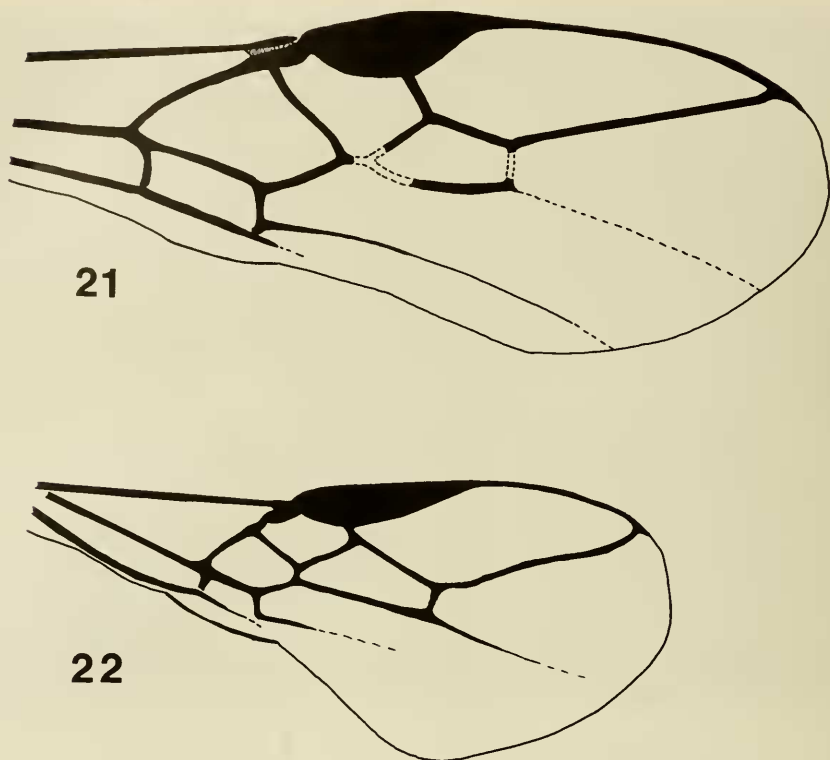


Figs. 17–20. *Opius dissitus* Muesebeck. 17, Dorsal view of pro- and mesonotum. 18, Dorsal view of propodeum and petiole. 19, Lateral view of mesosoma. 20, Lateral view of petiole.

tween socket and eye; antenna nearly $1.5\times$ longer than body. Maxillary palpi shorter than head height.

Mesosoma.— 1.21 ± 0.03 times longer than high, 1.46 ± 0.06 times higher than wide. Pronope small and deep. Mesonotum nearly bare, with a line of hairs along lateral margin from notaulus to tegula, and 1–3 hairs per side between end of notaulus and posterior border (Fig. 17). Notaulus represented by a short crease confined to declivous portion of mesonotum. Midpit absent. Scutellum with only a few hairs laterally. Prescutellar groove short and wide, with numerous ridges (Fig. 17). Propodeum largely smooth and bare (Fig. 18), long erect hairs confined primarily to basal lateral area, median apical region weakly rugulose. Pro- and mesopleura smooth and bare or nearly so (Fig. 19), sternaulus absent or represented only by a very broad, weak crease, posterior border of mesopleuron unsculptured dorsally. Metapleuron smooth medially, with a few scattered hairs, weakly rugulose just above coxa and below wing base. Hindfemur 4.08 ± 0.40 times longer than wide.

Wing (Fig. 22).—Stigma wedge-shaped, broader than r1, r1 arising from about basal third; r2 about $6.5\text{--}8.5\times$ longer than r1, $1.40 \pm 0.17\times$ longer than cuqul, r2 and r1 forming a straight line (without a distinct angle between them), r3 sinuate, nearly reaching wing tip, $2.32 \pm 0.44\times$ longer than r2; n. rec. strongly postfurcal; second cutibal cell distinctly narrowing distally; d3 nearly always absent, brachius weak distally, leaving brachial cell open at lower distal corner.



Figs. 21–22. Fore wings. 21, *Macrocentrus prolificus*, new species; 22, *Opius dissitus* Muesebeck.

Hindwing with postnervellus and radiellian present, but only as very weakly pigmented creases.

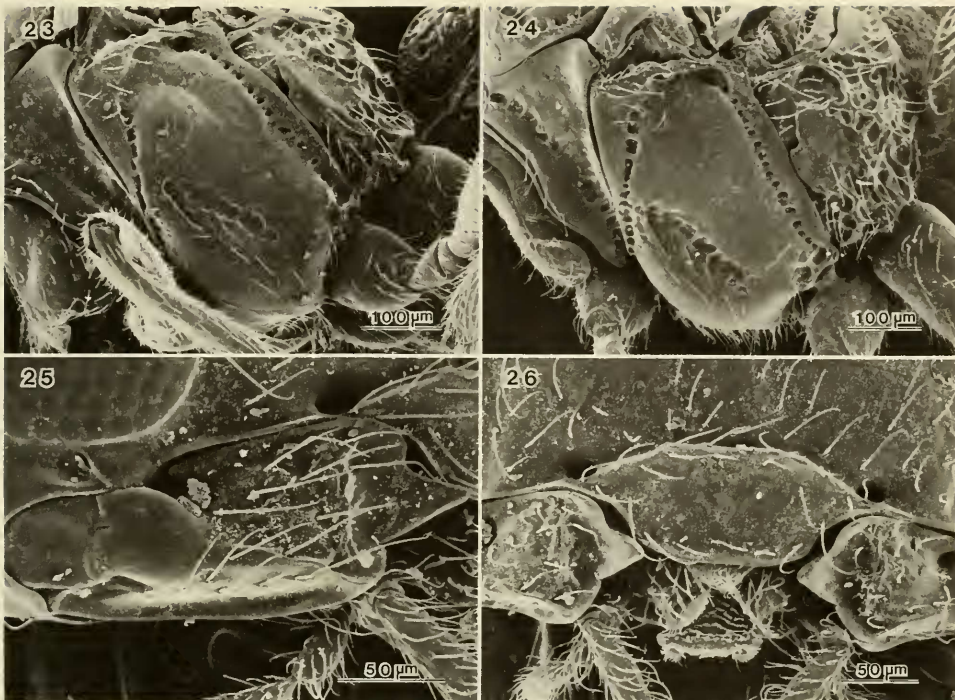
Metasoma.—Petiole about as long as apical width, apex $1.72 \pm 0.16 \times$ wider than base; carinae strong over apical half, weakly converging but still widely separated posteriorly, not reaching posterior margin; petiole (Figs. 18, 20) rugulose over posterior half. Rest of metasoma unsculptured. Ovipositor short, barely extending beyond tip of abdomen; sheath as long as petiole, but full length rarely visible without dissection.

Color.—Black; flagellum dark brown; tergum 2, and usually at least base of tergum 3, palps, scape (at least ventrally), annellus, coxae, trochanters, and femora yellow; petiole variable, usually dark yellow with brown patch medially; mandibles (except teeth) and clypeus dark to pale yellow; hindtarsi and most of hindtibia weakly infumate dorsally, fore- and midtibia and tarsi usually not distinctly infumate, except 5th tarsomeres brown.

♂.—Essentially as in female, but with measurements a little more variable; mesosoma $1.20\text{--}1.25 \times$ longer than high; lower mesopleuron between fore- and midcoxae frequently brown to yellow rather than black.

Length.—1.0–2.0 mm.

Material examined.—USA: Florida, Lake Buena Vista, III-16 to IV-5-1983, D. J. Vondal, B. M. Scott, reared from *Liriomyza sativae* Blanchard on *Sorghum*,



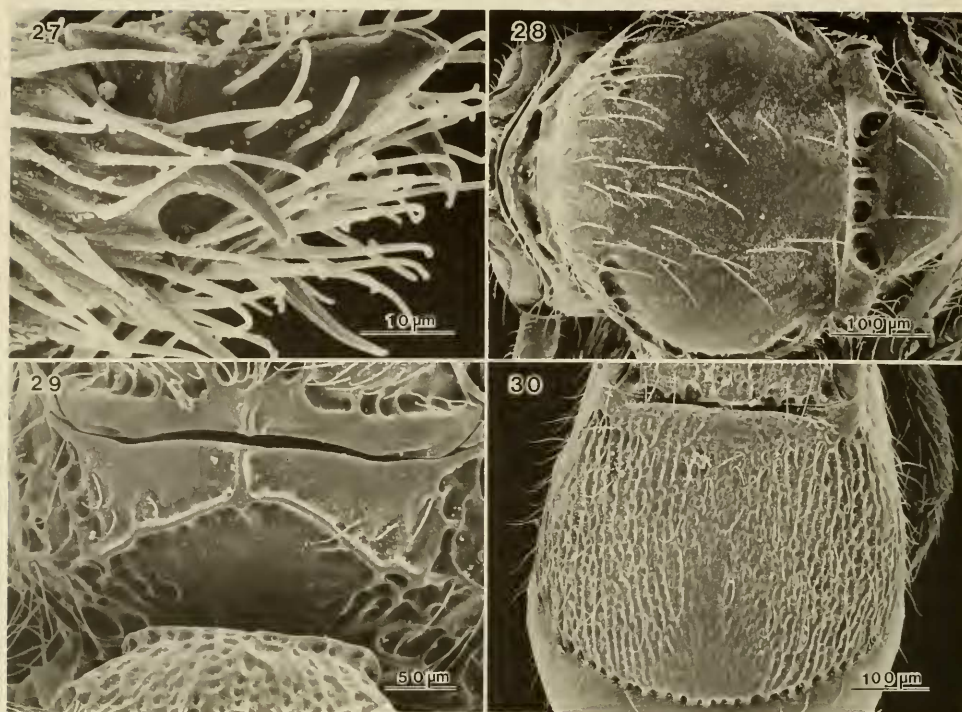
Figs. 23–26. *Oeonogastra microrhopalae* (Ashmead). 23, Lateral view of mesosoma, male. 24, Lateral view of mesosoma, female. 25, Mandible. 26, Clypeus.

Lycopersicon esculentum, and *Phaseolus* (4 ♀, 9 ♂); Homestead, 1983, reared from *Liriomyza* sp. on beans (2 ♀, 3 ♂). Hawaii, Oahu, Waimanalo, VII-1962, D. H. Habeck, M. Tamashiro, reared from *Liriomyza minutiseta* (Paratype series, 12 ♀, 5 ♂).

Diagnosis.—This species is nearly identical to *O. pallipes* Wesmael, but the petiole is distinctly lighter in color (completely dark in *O. pallipes*). Both *O. dissitus* and *O. pallipes* have been confused with some of the other opiines attacking *Liriomyza* in North America. They may be readily identified, however, by the combination of sternaulus and mesonotal midpit absent, mandible abruptly widened at base, and clypeus large, semicircular (without opening between clypeus and mandibles).

Discussion.—*Opius dissitus* was originally described from Hawaii, and was previously known only from this state. It is possible that this may represent an accidental introduction of *O. dissitus* from Hawaii to Florida. However, it may be more likely that the Hawaiian population originated from North America, since *O. dissitus* belongs to a species group which is largely Holarctic.

The clypeus was somewhat darker in the material from Florida, and the body dark brown rather than black in the material from Hawaii. However, the color pattern was affected slightly by state of preservation and especially whether or not specimens had first been stored in alcohol before pinning. In 80% of the material examined, the third discoideal segment was completely absent. In the



Figs. 27–30. *Oenonogastra microrhopalae* (Ashmead). 27, Tarsal claw. 28, Dorsal view, pro- and mesonotum. 29, Dorsal view, propodeum and petiole. 30, Dorsal view, metasomal sculpture.

other 20%, it was represented either by a very weakly sclerotized segment or a more strongly sclerotized, but incomplete stub. This segment was represented in 41.1% of the males, but only 5.6% of the females.

Opius bruneipes Gahan and *Opius dimidiatus* (Ashmead)

These two species have frequently been reared from *Liriomyza* in North America, and are sometimes confused, either with each other or with *O. dissitus*. Unlike *O. dissitus*, both *O. bruneipes* and *O. dimidiatus* have a narrow clypeus with concave lower border. There is thus a distinct opening present between the clypeus and mandibles when the mandibles are closed. The brachial cell is broadly open at its posterior distal corner in *O. bruneipes*, but closed or nearly so in *O. dimidiatus*. The sternaulus is absent or nearly so in *O. bruneipes* (never sculptured), but represented by a short, usually weakly crenulate crease in *O. dimidiatus*. The propodeum is unsculptured in *O. bruneipes*, and sculptured in *O. dimidiatus*. The two are placed in different subgenera by Fischer (1977), and the holotypes in the USNM, which I have examined, conform to his diagnoses.

Oenonogastra microrhopalae (Ashmead)

Figs. 23–30

Mesocrina (?) *microrhopalae* Ashmead, 1896: 217.

Oenonogastra microrhopalae (Ashmead): Ashmead 1900: 105.

Ashmead (1896) described this species from several specimens collected from Rosslyn, Va. The lectotype with Ashmead's hand-written labels "Mesocrina microrhopalae Ash" and "Type" is in the USNM. Although both the label and the original description indicate a male, the specimen is actually a female. This fact has been overlooked in previous treatments of this species (e. g., Fischer, 1967; Shenefelt, 1974; Marsh, 1979; Wharton, 1980) because the lectotype either had not been examined or had not been examined in detail. The ovipositor is very short, not visible in dorsal view, and was apparently missed when Ashmead prepared his description of this species. It is also possible that Ashmead's description was based on one of the other members of the Rosslyn series. Since the female mentioned above bears both type and ♂ labels, however, it seems preferable to regard it as the lectotype. To avoid further confusion, I hereby designate it as such. In addition to the 2 labels in Ashmead's handwriting, and a "Rosslyn Va" label, there are the following: "Note No. 1402⁰³" and "Type No. 50158 U.S.N.M.," the latter in red.

Fischer (1967) redescribed *O. microrhopalae*, and figured the forewing. Wharton (1980) presented a generic diagnosis, and figured the forewing of an undescribed species. *O. microrhopalae* is widely distributed in eastern United States (Marsh 1979), but sculptural variation in the material at hand is as great within various reared series as it is between them (e.g., Figs. 23–24). Intraspecific variation is most evident in the relative strength or development of the sculptural features; and in coloration of the metasoma. Interspecific variation in *Oenogastra* is most evident in the pattern of abdominal sculpture; and in mesosomal coloration.

Sculpture and shape of mandibles, clypeus, tarsal claws, mesosoma, and metasoma are illustrated in Figs. 23–30 for *O. microrhopalae*. The shape of mandibles and clypeus are distinctive for the genus. The latter is distinctly impressed ventrally, and truncate. The claws (Fig. 27) are very short and hairy. A small pronope is present, with deeper depressions to either side. Tergum 2 + 3 is distinctly punctate with longitudinal ridges more distinct laterally. This pattern is typical of *O. microrhopalae*. The legs of *O. microrhopalae* are yellow, with most of hindtibia and hindtarsi dorsally weakly infumate. The head and mesosoma vary from light to dark brown, and the metasoma varies from yellow to dark brown (rarely uniform in coloration).

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